

Figure 1.

## Alignment of fungal lipolytic enzyme sequences

	1					50	
SEQ ID NO: 1	.....	EVSQDLFNQF	NLFAQYSAAA	.....	YCG	KNNDAPAGTN	33
SEQ ID NO: 2	.....	AV	GVTTFDFS NF	KFYIQHGAAA	.....	YC. .NSEAAAGSK	33
SEQ ID NO: 3	SSSTQDYRI	ASEAEIKAHT	FYTALSANA.	.....	YCR	TVIPG.....	
SEQ ID NO: 4	.SSSTQDYRI	ASEAEIKAHT	FYTALSANA.	.....	YCR	TVIPG.....	
SEQ ID NO: 5	.SIDGGIRA	ATSQEI NELT	YYTTLSANS.	.....	YCR	TVIPG.....	
SEQ ID NO: 6	.SASDGGKV	AATTAQIQEF	TKYAGIAATA	.....	YCR	SVVPG.....	
SEQ ID NO: 7	....TAGQAL	AASTQ.GISE	DLYNRL.VEM	ATISQAAYAD	LCNIPST...		
SEQ ID NO: 8	....TAGHAL	AASTQ.GISE	DLYSRL.VEM	ATISQAAYAD	LCNIPST...		
SEQ ID NO: 9	.....	TVTQDL SNF	RFYLQHADAA	.....	YC.	.NFNTAVGKP	
SEQ ID NO: 10	.....	DIPTTQLEDF	KFWVQYAAAT	.....	YCP	NNYVAKDGEK	
SEQ ID NO: 11	.....	DVSTSELDQF	EFWVQYAAAS	.....	YYE	ADYTAQVGD	
SEQ ID NO: 12	.....	SVSTSTLDEL	QLFAQWSAAA	.....	YCS	NNID.SKDSN	
SEQ ID NO: 13	.....	SVSTSTLDEL	QLFSQWSAAA	.....	YCS	NNID.SDDSN	
SEQ ID NO: 14	.....	DVSSSLNNL	DLFAQYSAAA	.....	YCD	ENLN.STGTK	
	51					100	
SEQ ID NO: 1	ITCTGNACPE	VEKADATFLY	SFE.DSGVGD	VTGFLALDNT	NKLIVLSFRG		82
SEQ ID NO: 2	ITCSNNGCPT	VQNGATIVT	SF..VGSKTG	IGGYVATDSA	RKEIVVSFRG		81
SEQ ID NO: 3	GRWSCPHCGV	AS..NLQITK	TFTT..LITD	TNVLVAVGEK	EKTIYVVFGR		
SEQ ID NO: 4	GQWSCPHCDV	AP..NLNITK	TFTT..LITD	TNVLVAVGEN	EKTIYVVFGR		
SEQ ID NO: 5	ATWDCIHCD	TE..DLKIK	TWST..LIYD	TNAMVARGDS	EKTIYVVFGR		
SEQ ID NO: 6	NKWDCVQCQK	WVP.DGKIIT	TFTS..LLSD	TNGYVLRSDK	QKTIYLVFRG		
SEQ ID NO: 7	.....	.....	IIK	GEKIYNAQTD	INGWILRDDT	SKEIITVFRG	
SEQ ID NO: 8	.....	.....	IIK	GEKIYNSQTD	INGWILRDDT	SKEIITVFRG	
SEQ ID NO: 9	VHCSAGNCPD	IEKDAAIVVG	SV..VGTKTG	IGAYVATDNA	RKEIVVSFRG		
SEQ ID NO: 10	LNC SVGNCPD	VEAAGSTVKL	SFS.DDTITD	TAGFVAVDNT	NKAI VVAFRG		
SEQ ID NO: 11	LSCSKGNCPE	VEATGATVSL	DFS.DSTITD	TAGYIAVDHT	NSAVVLA FRG		
SEQ ID NO: 12	LTCTANACPS	VEEASTMMLL	EFDLTND FGG	TAGFLAADNT	NKRLVVA FRG		
SEQ ID NO: 13	VTCTADACPS	VEEASTKMLL	EFDLTNN FGG	TAGFLAADNT	NKRLVVA FRG		
SEQ ID NO: 14	LTCSVGNCPL	VEAASTQSLD	EFNESSSYGN	PAGYLAADET	NKLLVLVSFRG		
	101					150	
SEQ ID NO: 1	SRSIENWIGN	LNFDLKEIND	I..CSGCRGH	DGFTSSWRSV	ADTLRQKVED		130
SEQ ID NO: 2	SINIRNWL TN	LDFG.QEDCS	L..VSGCGVH	SGFQRAWNEI	SSQATAAVAS		128
SEQ ID NO: 3	TSSIRNAIAD	IVFVPVNYPP	V...NGAKVH	KGFLDSYNEV	QDKLVAEVKA		
SEQ ID NO: 4	TSSIRNAIAD	IVFVPVNYPP	V...NGAKVH	KGFLDSYNEV	QDKLVAEVKA		
SEQ ID NO: 5	SSSIRNWIAD	LTFVPVSYP	V...SGTKVH	KGFLDSYGEV	QNELVATVLD		
SEQ ID NO: 6	TNSFRSAITD	IVFNFSYK	V...KGAKVH	AGFLSSYEQV	VNDYFPVVQ		
SEQ ID NO: 7	TGSDTNLQLD	TNYTLTPFDT	LPQCNDCEVH	GGYYIGWISV	QDQVESLVKQ		
SEQ ID NO: 8	TGSDTNLQLD	TNYTLTPFDT	LPQCNSCEVH	GGYYIGWISV	QDQVESLVKQ		
SEQ ID NO: 9	SINVRNWI TN	FNFG.QKTC	L..VAGCGVH	TGFLDAWEEV	AANVKA AVSA		
SEQ ID NO: 10	SYSIRNWVTD	ATFP.QTDPG	L..CDGCKAE	LGFWTAWKV	RDRIIKTLDE		
SEQ ID NO: 11	SYSVRNWVAD	ATFV.HTNPG	L..CDGCLAE	LGFWSSWKLV	RDDI IKELKE		
SEQ ID NO: 12	SSTIENWIAN	LDFILEDNDD	L..CTGCKVH	TGFWKAWESA	ADELTSKIKS		
SEQ ID NO: 13	SSTIKNWIAD	LDFILQDND	L..CTGCKVH	TGFWKAWESA	ADNLTSKIKS		
SEQ ID NO: 14	SADLANWVAN	LNFGLEDASD	L..CSGCEVH	SGFWKAWSEI	ADTITSKVES		
	151					200	
SEQ ID NO: 1	AVREHPDYRV	VFTGHS LGGA	LATVAGADLR	GNGY.....D	IDVFSYGAPR		175
SEQ ID NO: 2	ARKANPSFNV	ISTGHS LGGA	VAVLAAANLR	VGGT.....P	VDIYTYGSPR		173
SEQ ID NO: 3	QLDRHPGYKI	VVTGHS LGGA	TAVLSALDLY	HHGHA.....N	IEIYTQGQPR		
SEQ ID NO: 4	QLDRHPGYKI	VVTGHS LGGA	TAVLSALDLY	HHGHD.....N	IEIYTQGQPR		
SEQ ID NO: 5	QFKQYPSYKV	AVTGHS LGGA	TALLCALDLY	QREEGLSSSN	LFLYTQGQPR		
SEQ ID NO: 6	QLTAHPTYKV	IVTGHS LGGA	QALLAGMDLY	QREPRLSPKN	LSIFTVGGPR		
SEQ ID NO: 7	QASQYPDYAL	TVTGHSLGAS	MAALTA AQL.	SATYD.....N	VRLYTFGEPR		
SEQ ID NO: 8	QVSQFPDYAL	TVTGHSLGAS	LAALTA AQL.	SATYD.....N	IRLYTFGEPR		
SEQ ID NO: 9	AKTANPTFKF	VVTGHS LGGA	VATIAAAYLR	KDGF.....P	FDLYTYGSPR		
SEQ ID NO: 10	LKPEHSDYKI	VVVGHS LGAA	IASLAAADLR	TKNY.....D	AILYAYAAPR		

Fig. 1 cont.

SEQ ID NO: 11	VVAQNPNYEL	VVVGHS LGAA	VATLAATDLR	GKGYP.....S	AKLYAYASPR	
SEQ ID NO: 12	AMSTYSGYTL	YFTGHS LGGA	LATLGATVLR	NDGY.....S	VELYTYGCPR	
SEQ ID NO: 13	AMSTYSGYTL	YFTGHS LGGA	LATLGATVLR	NDGY.....S	VELYTYGCPR	
SEQ ID NO: 14	ALSDHSDYSL	VLTGHSYGAA	LAALAATALR	NSGH.....S	VELYNYGQPR	
201						250
SEQ ID NO: 1	VGNRAFAEFL	TVQ.....T	GGTLYRITH	NDIVPRLPPR	EFGYSHSSPE	219
SEQ ID NO: 2	VGNAQLSAFV	SNQ.....	AGGEYRVTHA	DDPVPRLPPL	IFGYRHTTPE	216
SEQ ID NO: 3	IGTPAFANYV	IGT.....	KIPYQRLVHE	RDIVPHLPPG	AFGFLHAGEE	
SEQ ID NO: 4	IGTPEFANYV	IGT.....	KIPYQRLVNE	RDIVPHLPPG	AFGFLHAGEE	
SEQ ID NO: 5	VGDPAFANYV	VST.....	GIPYRRTVNE	RDIVPHLPPA	AFGFLHAGEE	
SEQ ID NO: 6	VGNPTFAYYV	EST.....	GIPFQRTVHK	RDIVPHVPPQ	SFGFLHPGVE	
SEQ ID NO: 7	SGNQAFASYM	NDAFQVSSPE	TTQYFRVTHS	NDGIPNLPPA	DEGYAHGGVE	
SEQ ID NO: 8	S.NQAFASYM	NDAFQASSPD	TTQYFRVTHA	NDGIPNLPPA	DEGYAHGVVE	
SEQ ID NO: 9	VGNDFEFANFV	TQQ.....	TGAEYRVTHG	DDPVPRLPPI	VFGYRHTSPE	
SEQ ID NO: 10	VANKPLAEFI	TNQ.....	.GNNYRFTHN	DDPVPKLPPL	TMGYVHISPE	
SEQ ID NO: 11	VGNAALAKYI	TAQ.....	.GNNFRFTHT	NDPVPKLPPL	SMGYVHVSPE	
SEQ ID NO: 12	IGNYALAEHI	TSQ.....G	SGANFRVTHL	NDIVPRVPPM	DFGFSQPSPE	
SEQ ID NO: 13	VGNYALAEHI	TSQ.....G	SGANFPVTHL	NDIVPRVPPM	DFGFSQPSPE	
SEQ ID NO: 14	LGNEALATYI	TDQ.....N	KGGNYRVTH	NDIVPKLPPT	LLGYHHFSPE	
251						300
SEQ ID NO: 1	YWIKS..GTL	VPVTRNDIVK	IEGIDATG.G	NNQPNIP...	DIPAH LWYF.	262
SEQ ID NO: 2	FWLSGGGGDK	VDYTTISDVKV	CEGAANLG.C	NGGTLGL...	DIAAHLHYF.	261
SEQ ID NO: 3	FWIMK.....	...DSSLRV	CPNGIETDNC	SNSIVPFT..	SVIDHLSYLD	
SEQ ID NO: 4	FWIMK.....	...DSSLRV	CPNGIETDNC	SNSIVPFT..	SVIDHLSYLD	
SEQ ID NO: 5	YWITD.....	..NSPETVQV	CTSDLETSDC	SNSIVPFT..	SVLDHLSYFG	
SEQ ID NO: 6	SWIKS.....	...GTSNVQI	CTSEIETKDC	SNSIVPFT..	SILDHLSYFD	
SEQ ID NO: 7	YWSV....DP	YSAQNTFVCT	GDEVQCCE.A	QGGQGVN...	..DAHTTYF.	
SEQ ID NO: 8	YWSV....DP	YSAQNTFVCT	GDEVQCCE.A	QGGQGVN...	..NAHTTYF.	
SEQ ID NO: 9	YWLNG.GPLD	KDYTVTEIKV	CEGIANVM.C	NGGTIGL...	DILAHITYF.	
SEQ ID NO: 10	YYITA..PDN	TTVTDNQVTV	LDGYVNFK.G	NTGTSGGLPD	LLAFHSHVWY	
SEQ ID NO: 11	YWITS..PNN	ATVSTSDIKV	IDGDVSFD.G	NTGTGLPLLT	DFEAHIWYF.	
SEQ ID NO: 12	YWITS..GNG	ASVTASDIEV	IEGINSTA.G	NAGEATV...	SVLAHLWYF.	
SEQ ID NO: 13	YWITS..GTG	ASVTASDIEL	IEGINSTA.G	NAGEATV...	DVLAHLWYF.	
SEQ ID NO: 14	YYISS..ADE	ATVTTTDTVTE	VTGIDATG.G	NDGTDGT...	SIDAH RWYF.	
301						350
SEQ ID NO: 1	GLIGT.CL..	.....	.....	.....	.....	269
SEQ ID NO: 2	QATDA.CNAG	GFS.....	.....	.....	.....	286
SEQ ID NO: 3	MNTGL.CL..	.....	.....	.....	.....	
SEQ ID NO: 4	MNTGL.CL..	.....	.....	.....	.....	
SEQ ID NO: 5	INTGL.CT..	.....	.....	.....	.....	
SEQ ID NO: 6	INEGS.CL..	.....	.....	.....	.....	
SEQ ID NO: 7	GMTSGACTW.	.....	.....	.....	.....	
SEQ ID NO: 8	GMTSGHCTW	.....	.....	.....	.....	
SEQ ID NO: 9	QSMAT.CAPI	AIPWKR....	.....	.....	.....	
SEQ ID NO: 10	FIHADACKGP	GLPLR.....	.....	.....	.....	
SEQ ID NO: 11	VQVDAGKGP	LPFKR.....	.....	.....	.....	
SEQ ID NO: 12	FAISE.CLL.	.....	.....	.....	.....	
SEQ ID NO: 13	FAISE.CLL.	.....	.....	.....	.....	
SEQ ID NO: 14	IYISE.CS..	.....	.....	.....	.....	

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SEQUENCE LISTING

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<120> Lipolytic enzyme variants

<130> 10470-WO

<160> 14

<170> PatentIn version 3.2

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<213> Thermomyces lanuginosus

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Glu Val Ser Gln Asp Leu Phe Asn Gln Phe Asn Leu Phe Ala Gln Tyr  
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Ser Ala Ala Ala Tyr Cys Gly Lys Asn Asn Asp Ala Pro Ala Gly Thr  
 20 25 30

Asn Ile Thr Cys Thr Gly Asn Ala Cys Pro Glu Val Glu Lys Ala Asp  
 35 40 45

Ala Thr Phe Leu Tyr Ser Phe Glu Asp Ser Gly Val Gly Asp Val Thr  
 50 55 60

Gly Phe Leu Ala Leu Asp Asn Thr Asn Lys Leu Ile Val Leu Ser Phe  
 65 70 75 80

Arg Gly Ser Arg Ser Ile Glu Asn Trp Ile Gly Asn Leu Asn Phe Asp  
 85 90 95

Leu Lys Glu Ile Asn Asp Ile Cys Ser Gly Cys Arg Gly His Asp Gly  
 100 105 110

Phe Thr Ser Ser Trp Arg Ser Val Ala Asp Thr Leu Arg Gln Lys Val  
 115 120 125

Glu Asp Ala Val Arg Glu His Pro Asp Tyr Arg Val Val Phe Thr Gly  
 130 135 140

His Ser Leu Gly Gly Ala Leu Ala Thr Val Ala Gly Ala Asp Leu Arg  
 145 150 155 160

Gly Asn Gly Tyr Asp Ile Asp Val Phe Ser Tyr Gly Ala Pro Arg Val  
 165 170 175

Gly Asn Arg Ala Phe Ala Glu Phe Leu Thr Val Gln Thr Gly Gly Thr  
 180 185 190

Leu Tyr Arg Ile Thr His Thr Asn Asp Ile Val Pro Arg Leu Pro Pro

195

200

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205

Arg Glu Phe Gly Tyr Ser His Ser Ser Pro Glu Tyr Trp Ile Lys Ser  
 210 215 220

Gly Thr Leu Val Pro Val Thr Arg Asn Asp Ile Val Lys Ile Glu Gly  
 225 230 235 240

Ile Asp Ala Thr Gly Gly Asn Asn Gln Pro Asn Ile Pro Asp Ile Pro  
 245 250 255

Ala His Leu Trp Tyr Phe Gly Leu Ile Gly Thr Cys Leu  
 260 265

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 <213> Fusarium oxysporum

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Ala Val Gly Val Thr Thr Thr Asp Phe Ser Asn Phe Lys Phe Tyr Ile  
 1 5 10 15

Gln His Gly Ala Ala Ala Tyr Cys Asn Ser Glu Ala Ala Ala Gly Ser  
 20 25 30

Lys Ile Thr Cys Ser Asn Asn Gly Cys Pro Thr Val Gln Gly Asn Gly  
 35 40 45

Ala Thr Ile Val Thr Ser Phe Val Gly Ser Lys Thr Gly Ile Gly Gly  
 50 55 60

Tyr Val Ala Thr Asp Ser Ala Arg Lys Glu Ile Val Val Ser Phe Arg  
 65 70 75 80

Gly Ser Ile Asn Ile Arg Asn Trp Leu Thr Asn Leu Asp Phe Gly Gln  
 85 90 95

Glu Asp Cys Ser Leu Val Ser Gly Cys Gly Val His Ser Gly Phe Gln  
 100 105 110

Arg Ala Trp Asn Glu Ile Ser Ser Gln Ala Thr Ala Ala Val Ala Ser  
 115 120 125

Ala Arg Lys Ala Asn Pro Ser Phe Asn Val Ile Ser Thr Gly His Ser  
 130 135 140

Leu Gly Gly Ala Val Ala Val Leu Ala Ala Ala Asn Leu Arg Val Gly  
 145 150 155 160

Gly Thr Pro Val Asp Ile Tyr Thr Tyr Gly Ser Pro Arg Val Gly Asn  
 165 170 175

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Ala Gln Leu Ser Ala Phe Val Ser Asn Gln Ala Gly Gly Glu Tyr Arg  
 180 185 190

Val Thr His Ala Asp Asp Pro Val Pro Arg Leu Pro Pro Leu Ile Phe  
 195 200 205

Gly Tyr Arg His Thr Thr Pro Glu Phe Trp Leu Ser Gly Gly Gly Gly  
 210 215 220

Asp Lys Val Asp Tyr Thr Ile Ser Asp Val Lys Val Cys Glu Gly Ala  
 225 230 235 240

Ala Asn Leu Gly Cys Asn Gly Gly Thr Leu Gly Leu Asp Ile Ala Ala  
 245 250 255

His Leu His Tyr Phe Gln Ala Thr Asp Ala Cys Asn Ala Gly Gly Phe  
 260 265 270

Ser Trp Arg Arg Tyr Arg Ser Ala Glu Ser Val Asp Lys Arg  
 275 280 285

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<211> 265

<212> PRT

<213> Absidia reflexa

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Ser Ser Ser Ser Thr Gln Asp Tyr Arg Ile Ala Ser Glu Ala Glu Ile  
 1 5 10 15

Lys Ala His Thr Phe Tyr Thr Ala Leu Ser Ala Asn Ala Tyr Cys Arg  
 20 25 30

Thr Val Ile Pro Gly Gly Arg Trp Ser Cys Pro His Cys Gly Val Ala  
 35 40 45

Ser Asn Leu Gln Ile Thr Lys Thr Phe Ser Thr Leu Ile Thr Asp Thr  
 50 55 60

Asn Val Leu Val Ala Val Gly Glu Lys Glu Lys Thr Ile Tyr Val Val  
 65 70 75 80

Phe Arg Gly Thr Ser Ser Ile Arg Asn Ala Ile Ala Asp Ile Val Phe  
 85 90 95

Val Pro Val Asn Tyr Pro Pro Val Asn Gly Ala Lys Val His Lys Gly  
 100 105 110

Phe Leu Asp Ser Tyr Asn Glu Val Gln Asp Lys Leu Val Ala Glu Val  
 115 120 125

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Lys Ala Gln Leu Asp Arg His Pro Gly Tyr Lys Ile Val Val Thr Gly  
 130 135 140  
 His Ser Leu Gly Gly Ala Thr Ala Val Leu Ser Ala Leu Asp Leu Tyr  
 145 150 155 160  
 His His Gly His Ala Asn Ile Glu Ile Tyr Thr Gln Gly Gln Pro Arg  
 165 170 175  
 Ile Gly Thr Pro Ala Phe Ala Asn Tyr Val Ile Gly Thr Lys Ile Pro  
 180 185 190  
 Tyr Gln Arg Leu Val His Glu Arg Asp Ile Val Pro His Leu Pro Pro  
 195 200 205  
 Gly Ala Phe Gly Phe Leu His Ala Gly Glu Glu Phe Trp Ile Met Lys  
 210 215 220  
 Asp Ser Ser Leu Arg Val Cys Pro Asn Gly Ile Glu Thr Asp Asn Cys  
 225 230 235 240  
 Ser Asn Ser Ile Val Pro Phe Thr Ser Val Ile Asp His Leu Ser Tyr  
 245 250 255  
 Leu Asp Met Asn Thr Gly Leu Cys Leu  
 260 265

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 <213> Absidia corymbifera

<400> 4

Ser Ser Ser Thr Gln Asp Tyr Arg Ile Ala Ser Glu Ala Glu Ile Lys  
 1 5 10 15  
 Ala His Thr Phe Tyr Thr Ala Leu Ser Ala Asn Ala Tyr Cys Arg Thr  
 20 25 30  
 Val Ile Pro Gly Gly Gln Trp Ser Cys Pro His Cys Asp Val Ala Pro  
 35 40 45  
 Asn Leu Asn Ile Thr Lys Thr Phe Thr Thr Leu Ile Thr Asp Thr Asn  
 50 55 60  
 Val Leu Val Ala Val Gly Glu Asn Glu Lys Thr Ile Tyr Val Val Phe  
 65 70 75 80  
 Arg Gly Thr Ser Ser Ile Arg Asn Ala Ile Ala Asp Ile Val Phe Val  
 85 90 95

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Pro Val Asn Tyr Pro Pro Val Asn Gly Ala Lys Val His Lys Gly Phe  
 100 105 110

Leu Asp Ser Tyr Asn Glu Val Gln Asp Lys Leu Val Ala Glu Val Lys  
 115 120 125

Ala Gln Leu Asp Arg His Pro Gly Tyr Lys Ile Val Val Thr Gly His  
 130 135 140

Ser Leu Gly Gly Ala Thr Ala Val Leu Ser Ala Leu Asp Leu Tyr His  
 145 150 155 160

His Gly His Asp Asn Ile Glu Ile Tyr Thr Gln Gly Gln Pro Arg Ile  
 165 170 175

Gly Thr Pro Glu Phe Ala Asn Tyr Val Ile Gly Thr Lys Ile Pro Tyr  
 180 185 190

Gln Arg Leu Val Asn Glu Arg Asp Ile Val Pro His Leu Pro Pro Gly  
 195 200 205

Ala Phe Gly Phe Leu His Ala Gly Glu Glu Phe Trp Ile Met Lys Asp  
 210 215 220

Ser Ser Leu Arg Val Cys Pro Asn Gly Ile Glu Thr Asp Asn Cys Ser  
 225 230 235 240

Asn Ser Ile Val Pro Phe Thr Ser Val Ile Asp His Leu Ser Tyr Leu  
 245 250 255

Asp Met Asn Thr Gly Leu Cys Leu  
 260

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 <212> PRT  
 <213> Rhizomucor miehei

<400> 5

Ser Ile Asp Gly Gly Ile Arg Ala Ala Thr Ser Gln Glu Ile Asn Glu  
 1 5 10 15

Leu Thr Tyr Tyr Thr Thr Leu Ser Ala Asn Ser Tyr Cys Arg Thr Val  
 20 25 30

Ile Pro Gly Ala Thr Trp Asp Cys Ile His Cys Asp Ala Thr Glu Asp  
 35 40 45

Leu Lys Ile Ile Lys Thr Trp Ser Thr Leu Ile Tyr Asp Thr Asn Ala  
 50 55 60

Met Val Ala Arg Gly Asp Ser Glu Lys Thr Ile Tyr Ile Val Phe Arg

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65                      70                      75                      80

Gly Ser Ser Ser Ile Arg Asn Trp Ile Ala Asp Leu Thr Phe Val Pro  
85                      90                      95

Val Ser Tyr Pro Pro Val Ser Gly Thr Lys Val His Lys Gly Phe Leu  
100                      105                      110

Asp Ser Tyr Gly Glu Val Gln Asn Glu Leu Val Ala Thr Val Leu Asp  
115                      120                      125

Gln Phe Lys Gln Tyr Pro Ser Tyr Lys Val Ala Val Thr Gly His Ser  
130                      135                      140

Leu Gly Gly Ala Thr Ala Leu Leu Cys Ala Leu Asp Leu Tyr Gln Arg  
145                      150                      155                      160

Glu Glu Gly Leu Ser Ser Ser Asn Leu Phe Leu Tyr Thr Gln Gly Gln  
165                      170                      175

Pro Arg Val Gly Asp Pro Ala Phe Ala Asn Tyr Val Val Ser Thr Gly  
180                      185                      190

Ile Pro Tyr Arg Arg Thr Val Asn Glu Arg Asp Ile Val Pro His Leu  
195                      200                      205

Pro Pro Ala Ala Phe Gly Phe Leu His Ala Gly Glu Glu Tyr Trp Ile  
210                      215                      220

Thr Asp Asn Ser Pro Glu Thr Val Gln Val Cys Thr Ser Asp Leu Glu  
225                      230                      235                      240

Thr Ser Asp Cys Ser Asn Ser Ile Val Pro Phe Thr Ser Val Leu Asp  
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His Leu Ser Tyr Phe Gly Ile Asn Thr Gly Leu Cys Thr  
260                      265

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Ser Ala Ser Asp Gly Gly Lys Val Val Ala Ala Thr Thr Ala Gln Ile  
1                      5                      10                      15

Gln Glu Phe Thr Lys Tyr Ala Gly Ile Ala Ala Thr Ala Tyr Cys Arg  
20                      25                      30

Ser Val Val Pro Gly Asn Lys Trp Asp Cys Val Gln Cys Gln Lys Trp  
35                      40                      45



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Val Pro Asp Gly Lys Ile Ile Thr Thr Phe Thr Ser Leu Leu Ser Asp  
 50 55 60

Thr Asn Gly Tyr Val Leu Arg Ser Asp Lys Gln Lys Thr Ile Tyr Leu  
 65 70 75 80

Val Phe Arg Gly Thr Asn Ser Phe Arg Ser Ala Ile Thr Asp Ile Val  
 85 90 95

Phe Asn Phe Ser Asp Tyr Lys Pro Val Lys Gly Ala Lys Val His Ala  
 100 105 110

Gly Phe Leu Ser Ser Tyr Glu Gln Val Val Asn Asp Tyr Phe Pro Val  
 115 120 125

Val Gln Glu Gln Leu Thr Ala His Pro Thr Tyr Lys Val Ile Val Thr  
 130 135 140

Gly His Ser Leu Gly Gly Ala Gln Ala Leu Leu Ala Gly Met Asp Leu  
 145 150 155 160

Tyr Gln Arg Glu Pro Arg Leu Ser Pro Lys Asn Leu Ser Ile Phe Thr  
 165 170 175

Val Gly Gly Pro Arg Val Gly Asn Pro Thr Phe Ala Tyr Tyr Val Glu  
 180 185 190

Ser Thr Gly Ile Pro Phe Gln Arg Thr Val His Lys Arg Asp Ile Val  
 195 200 205

Pro His Val Pro Pro Gln Ser Phe Gly Phe Leu His Pro Gly Val Glu  
 210 215 220

Ser Trp Ile Lys Ser Gly Thr Ser Asn Val Gln Ile Cys Thr Ser Glu  
 225 230 235 240

Ile Glu Thr Lys Asp Cys Ser Asn Ser Ile Val Pro Phe Thr Ser Ile  
 245 250 255

Leu Asp His Leu Ser Tyr Phe Asp Ile Asn Glu Gly Ser Cys Leu  
 260 265 270

&lt;210&gt; 7

&lt;211&gt; 267

&lt;212&gt; PRT

&lt;213&gt; Aspergillus niger

&lt;400&gt; 7

Thr Ala Gly Gln Ala Leu Ala Ala Ser Thr Gln Gly Ile Ser Glu Asp  
 1 5 10 15

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Leu Tyr Asn Arg Leu Val Glu Met Ala Thr Ile Ser Gln Ala Ala Tyr  
                   20                  25                  30  
 Ala Asp Leu Cys Asn Ile Pro Ser Thr Ile Ile Lys Gly Glu Lys Ile  
                   35                  40                  45  
 Tyr Asn Ala Gln Thr Asp Ile Asn Gly Trp Ile Leu Arg Asp Asp Thr  
                   50                  55                  60  
 Ser Lys Glu Ile Ile Thr Val Phe Arg Gly Thr Gly Ser Asp Thr Asn  
                   65                  70                  75                  80  
 Leu Gln Leu Asp Thr Asn Tyr Thr Leu Thr Pro Phe Asp Thr Leu Pro  
                   85                  90                  95  
 Gln Cys Asn Asp Cys Glu Val His Gly Gly Tyr Tyr Ile Gly Trp Ile  
                   100                  105                  110  
 Ser Val Gln Asp Gln Val Glu Ser Leu Val Lys Gln Gln Ala Ser Gln  
                   115                  120                  125  
 Tyr Pro Asp Tyr Ala Leu Thr Val Thr Gly His Ser Leu Gly Ala Ser  
                   130                  135                  140  
 Met Ala Ala Leu Thr Ala Ala Gln Leu Ser Ala Thr Tyr Asp Asn Val  
                   145                  150                  155                  160  
 Arg Leu Tyr Thr Phe Gly Glu Pro Arg Ser Gly Asn Gln Ala Phe Ala  
                   165                  170                  175  
 Ser Tyr Met Asn Asp Ala Phe Gln Val Ser Ser Pro Glu Thr Thr Gln  
                   180                  185                  190  
 Tyr Phe Arg Val Thr His Ser Asn Asp Gly Ile Pro Asn Leu Pro Pro  
                   195                  200                  205  
 Ala Asp Glu Gly Tyr Ala His Gly Gly Val Glu Tyr Trp Ser Val Asp  
                   210                  215                  220  
 Pro Tyr Ser Ala Gln Asn Thr Phe Val Cys Thr Gly Asp Glu Val Gln  
                   225                  230                  235                  240  
 Cys Cys Glu Ala Gln Gly Gly Gln Gly Val Asn Asp Ala His Thr Thr  
                   245                  250                  255  
 Tyr Phe Gly Met Thr Ser Gly Ala Cys Thr Trp  
                   260                  265

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10356-WO.ST25

&lt;213&gt; Aspergillus tubingensis

&lt;400&gt; 8

Thr Ala Gly His Ala Leu Ala Ala Ser Thr Gln Gly Ile Ser Glu Asp  
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Leu Tyr Ser Arg Leu Val Glu Met Ala Thr Ile Ser Gln Ala Ala Tyr  
20 25 30

Ala Asp Leu Cys Asn Ile Pro Ser Thr Ile Ile Lys Gly Glu Lys Ile  
35 40 45

Tyr Asn Ser Gln Thr Asp Ile Asn Gly Trp Ile Leu Arg Asp Asp Ser  
50 55 60

Ser Lys Glu Ile Ile Thr Val Phe Arg Gly Thr Gly Ser Asp Thr Asn  
65 70 75 80

Leu Gln Leu Asp Thr Asn Tyr Thr Leu Thr Pro Phe Asp Thr Leu Pro  
85 90 95

Gln Cys Asn Ser Cys Glu Val His Gly Gly Tyr Tyr Ile Gly Trp Ile  
100 105 110

Ser Val Gln Asp Gln Val Glu Ser Leu Val Gln Gln Gln Val Ser Gln  
115 120 125

Phe Pro Asp Tyr Ala Leu Thr Val Thr Gly His Ser Leu Gly Ala Ser  
130 135 140

Leu Ala Ala Leu Thr Ala Ala Gln Leu Ser Ala Thr Tyr Asp Asn Ile  
145 150 155 160

Arg Leu Tyr Thr Phe Gly Glu Pro Arg Ser Asn Gln Ala Phe Ala Ser  
165 170 175

Tyr Met Asn Asp Ala Phe Gln Ala Ser Ser Pro Asp Thr Thr Gln Tyr  
180 185 190

Phe Arg Val Thr His Ala Asn Asp Gly Ile Pro Asn Leu Pro Pro Ala  
195 200 205

Asp Glu Gly Tyr Ala His Gly Val Val Glu Tyr Trp Ser Val Asp Pro  
210 215 220

Tyr Ser Ala Gln Asn Thr Phe Val Cys Thr Gly Asp Glu Val Gln Cys  
225 230 235 240

Cys Glu Ala Gln Gly Gly Gln Gly Val Asn Asn Ala His Thr Thr Tyr  
245 250 255

10356-WO.ST25  
Phe Gly Met Thr Ser Gly His Cys Thr Trp  
260 265

<210> 9  
<211> 273  
<212> PRT  
<213> Fusarium heterosporum

<400> 9

Thr Val Thr Thr Gln Asp Leu Ser Asn Phe Arg Phe Tyr Leu Gln His  
1 5 10 15

Ala Asp Ala Ala Tyr Cys Asn Phe Asn Thr Ala Val Gly Lys Pro Val  
20 25 30

His Cys Ser Ala Gly Asn Cys Pro Asp Ile Glu Lys Asp Ala Ala Ile  
35 40 45

Val Val Gly Ser Val Val Gly Thr Lys Thr Gly Ile Gly Ala Tyr Val  
50 55 60

Ala Thr Asp Asn Ala Arg Lys Glu Ile Val Val Ser Val Arg Gly Ser  
65 70 75 80

Ile Asn Val Arg Asn Trp Ile Thr Asn Phe Asn Phe Gly Gln Lys Thr  
85 90 95

Cys Asp Leu Val Ala Gly Cys Gly Val His Thr Gly Phe Leu Asp Ala  
100 105 110

Trp Glu Glu Val Ala Ala Asn Val Lys Ala Ala Val Ser Ala Ala Lys  
115 120 125

Thr Ala Asn Pro Thr Phe Lys Phe Val Val Thr Gly His Ser Leu Gly  
130 135 140

Gly Ala Val Ala Thr Ile Ala Ala Ala Tyr Leu Arg Lys Asp Gly Phe  
145 150 155 160

Pro Phe Asp Leu Tyr Thr Tyr Gly Ser Pro Arg Val Gly Asn Asp Phe  
165 170 175

Phe Ala Asn Phe Val Thr Gln Gln Thr Gly Ala Glu Tyr Arg Val Thr  
180 185 190

His Gly Asp Asp Pro Val Pro Arg Leu Pro Pro Ile Val Phe Gly Tyr  
195 200 205

Arg His Thr Ser Pro Glu Tyr Trp Leu Asn Gly Gly Pro Leu Asp Lys  
210 215 220

Asp Tyr Thr Val Thr Glu Ile Lys Val Cys Glu Gly Ile Ala Asn Val

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235

225 230 240

Met Cys Asn Gly Gly Thr Ile Gly Leu Asp Ile Leu Ala His Ile Thr  
245 250 255Tyr Phe Gln Ser Met Ala Thr Cys Ala Pro Ile Ala Ile Pro Trp Lys  
260 265 270

Arg

<210> 10  
<211> 278  
<212> PRT  
<213> Aspergillus oryzae

&lt;400&gt; 10

Asp Ile Pro Thr Thr Gln Leu Glu Asp Phe Lys Phe Trp Val Gln Tyr  
1 5 10 15Ala Ala Ala Thr Tyr Cys Pro Asn Asn Tyr Val Ala Lys Asp Gly Glu  
20 25 30Lys Leu Asn Cys Ser Val Gly Asn Cys Pro Asp Val Glu Ala Ala Gly  
35 40 45Ser Thr Val Lys Leu Ser Phe Ser Asp Asp Thr Ile Thr Asp Thr Ala  
50 55 60Gly Phe Val Ala Val Asp Asn Thr Asn Lys Ala Ile Val Val Ala Phe  
65 70 75 80Arg Gly Ser Tyr Ser Ile Arg Asn Trp Val Thr Asp Ala Thr Phe Pro  
85 90 95Gln Thr Asp Pro Gly Leu Cys Asp Gly Cys Lys Ala Glu Leu Gly Phe  
100 105 110Trp Thr Ala Trp Lys Val Val Arg Asp Arg Ile Ile Lys Thr Leu Asp  
115 120 125Glu Leu Lys Pro Glu His Ser Asp Tyr Lys Ile Val Val Val Gly His  
130 135 140Ser Leu Gly Ala Ala Ile Ala Ser Leu Ala Ala Ala Asp Leu Arg Thr  
145 150 155 160Lys Asn Tyr Asp Ala Ile Leu Tyr Ala Tyr Ala Ala Pro Arg Val Ala  
165 170 175Asn Lys Pro Leu Ala Glu Phe Ile Thr Asn Gln Gly Asn Asn Tyr Arg  
180 185 190

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Phe Thr His Asn Asp Asp Pro Val Pro Lys Leu Pro Leu Leu Thr Met  
 195 200 205

Gly Tyr Val His Ile Ser Pro Glu Tyr Tyr Ile Thr Ala Pro Asp Asn  
 210 215 220

Thr Thr Val Thr Asp Asn Gln Val Thr Val Leu Asp Gly Tyr Val Asn  
 225 230 235 240

Phe Lys Gly Asn Thr Gly Thr Ser Gly Gly Leu Pro Asp Leu Leu Ala  
 245 250 255

Phe His Ser His Val Trp Tyr Phe Ile His Ala Asp Ala Cys Lys Gly  
 260 265 270

Pro Gly Leu Pro Leu Arg  
 275

<210> 11  
 <211> 278  
 <212> PRT  
 <213> Penicillium camemberti

<400> 11

Asp Val Ser Thr Ser Glu Leu Asp Gln Phe Glu Phe Trp Val Gln Tyr  
 1 5 10 15

Ala Ala Ala Ser Tyr Tyr Glu Ala Asp Tyr Thr Ala Gln Val Gly Asp  
 20 25 30

Lys Leu Ser Cys Ser Lys Gly Asn Cys Pro Glu Val Glu Ala Thr Gly  
 35 40 45

Ala Thr Val Ser Tyr Asp Phe Ser Asp Ser Thr Ile Thr Asp Thr Ala  
 50 55 60

Gly Tyr Ile Ala Val Asp His Thr Asn Ser Ala Val Val Leu Ala Phe  
 65 70 75 80

Arg Gly Ser Tyr Ser Val Arg Asn Trp Val Ala Asp Ala Thr Phe Val  
 85 90 95

His Thr Asn Pro Gly Leu Cys Asp Gly Cys Leu Ala Glu Leu Gly Phe  
 100 105 110

Trp Ser Ser Trp Lys Leu Val Arg Asp Asp Ile Ile Lys Glu Leu Lys  
 115 120 125

Glu Val Val Ala Gln Asn Pro Asn Tyr Glu Leu Val Val Val Gly His  
 130 135 140

## 10356-WO.ST25

Ser Leu Gly Ala Ala Val Ala Thr Leu Ala Ala Thr Asp Leu Arg Gly  
145 150 155 160

Lys Gly Tyr Pro Ser Ala Lys Leu Tyr Ala Tyr Ala Ser Pro Arg Val  
165 170 175

Gly Asn Ala Ala Leu Ala Lys Tyr Ile Thr Ala Gln Gly Asn Asn Phe  
180 185 190

Arg Phe Thr His Thr Asn Asp Pro Val Pro Lys Leu Pro Leu Leu Ser  
195 200 205

Met Gly Tyr Val His Val Ser Pro Glu Tyr Trp Ile Thr Ser Pro Asn  
210 215 220

Asn Ala Thr Val Ser Thr Ser Asp Ile Lys Val Ile Asp Gly Asp Val  
225 230 235 240

Ser Phe Asp Gly Asn Thr Gly Thr Gly Leu Pro Leu Leu Thr Asp Phe  
245 250 255

Glu Ala His Ile Trp Tyr Phe Val Gln Val Asp Ala Gly Lys Gly Pro  
260 265 270

Gly Leu Pro Phe Lys Arg  
275

<210> 12  
<211> 270  
<212> PRT  
<213> Aspergillus foetidus

<400> 12

Ser Val Ser Thr Ser Thr Leu Asp Glu Leu Gln Leu Phe Ala Gln Trp  
1 5 10 15

Ser Ala Ala Ala Tyr Cys Ser Asn Asn Ile Asp Ser Lys Asp Ser Asn  
20 25 30

Leu Thr Cys Thr Ala Asn Ala Cys Pro Ser Val Glu Glu Ala Ser Thr  
35 40 45

Thr Met Leu Leu Glu Phe Asp Leu Thr Asn Asp Phe Gly Gly Thr Ala  
50 55 60

Gly Phe Leu Ala Ala Asp Asn Thr Asn Lys Arg Leu Val Val Ala Phe  
65 70 75 80

Arg Gly Ser Ser Thr Ile Glu Asn Trp Ile Ala Asn Leu Asp Phe Ile  
85 90 95

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Leu Glu Asp Asn Asp Asp Leu Cys Thr Gly Cys Lys Val His Thr Gly  
 100 105 110

Phe Trp Lys Ala Trp Glu Ser Ala Ala Asp Glu Leu Thr Ser Lys Ile  
 115 120 125

Lys Ser Ala Met Ser Thr Tyr Ser Gly Tyr Thr Leu Tyr Phe Thr Gly  
 130 135 140

His Ser Leu Gly Gly Ala Leu Ala Thr Leu Gly Ala Thr Val Leu Arg  
 145 150 155 160

Asn Asp Gly Tyr Ser Val Glu Leu Tyr Thr Tyr Gly Cys Pro Arg Ile  
 165 170 175

Gly Asn Tyr Ala Leu Ala Glu His Ile Thr Ser Gln Gly Ser Gly Ala  
 180 185 190

Asn Phe Arg Val Thr His Leu Asn Asp Ile Val Pro Arg Val Pro Pro  
 195 200 205

Met Asp Phe Gly Phe Ser Gln Pro Ser Pro Glu Tyr Trp Ile Thr Ser  
 210 215 220

Gly Asn Gly Ala Ser Val Thr Ala Ser Asp Ile Glu Val Ile Glu Gly  
 225 230 235 240

Ile Asn Ser Thr Ala Gly Asn Ala Gly Glu Ala Thr Val Ser Val Leu  
 245 250 255

Ala His Leu Trp Tyr Phe Phe Ala Ile Ser Glu Cys Leu Leu  
 260 265 270

&lt;210&gt; 13

&lt;211&gt; 270

&lt;212&gt; PRT

&lt;213&gt; Aspergillus niger

&lt;400&gt; 13

Ser Val Ser Thr Ser Thr Leu Asp Glu Leu Gln Leu Phe Ser Gln Trp  
 1 5 10 15

Ser Ala Ala Ala Tyr Cys Ser Asn Asn Ile Asp Ser Asp Asp Ser Asn  
 20 25 30

Val Thr Cys Thr Ala Asp Ala Cys Pro Ser Val Glu Glu Ala Ser Thr  
 35 40 45

Lys Met Leu Leu Glu Phe Asp Leu Thr Asn Asn Phe Gly Gly Thr Ala  
 50 55 60

Gly Phe Leu Ala Ala Asp Asn Thr Asn Lys Arg Leu Val Val Ala Phe



Leu Thr Cys Ser Val Gly Asn Cys Pro Leu Val Glu Ala Ala Ser Thr  
35 40 45

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Gln Ser Leu Asp Glu Phe Asn Glu Ser Ser Ser Tyr Gly Asn Pro Ala  
 50 55 60  
 Gly Tyr Leu Ala Ala Asp Glu Thr Asn Lys Leu Leu Val Leu Ser Phe  
 65 70 75 80  
 Arg Gly Ser Ala Asp Leu Ala Asn Trp Val Ala Asn Leu Asn Phe Gly  
 85 90 95  
 Leu Glu Asp Ala Ser Asp Leu Cys Ser Gly Cys Glu Val His Ser Gly  
 100 105 110  
 Phe Trp Lys Ala Trp Ser Glu Ile Ala Asp Thr Ile Thr Ser Lys Val  
 115 120 125  
 Glu Ser Ala Leu Ser Asp His Ser Asp Tyr Ser Leu Val Leu Thr Gly  
 130 135 140  
 His Ser Tyr Gly Ala Ala Leu Ala Ala Leu Ala Ala Thr Ala Leu Arg  
 145 150 155 160  
 Asn Ser Gly His Ser Val Glu Leu Tyr Asn Tyr Gly Gln Pro Arg Leu  
 165 170 175  
 Gly Asn Glu Ala Leu Ala Thr Tyr Ile Thr Asp Gln Asn Lys Gly Gly  
 180 185 190  
 Asn Tyr Arg Val Thr His Thr Asn Asp Ile Val Pro Lys Leu Pro Pro  
 195 200 205  
 Thr Leu Leu Gly Tyr His His Phe Ser Pro Glu Tyr Tyr Ile Ser Ser  
 210 215 220  
 Ala Asp Glu Ala Thr Val Thr Thr Thr Asp Val Thr Glu Val Thr Gly  
 225 230 235 240  
 Ile Asp Ala Thr Gly Gly Asn Asp Gly Thr Asp Gly Thr Ser Ile Asp  
 245 250 255  
 Ala His Arg Trp Tyr Phe Ile Tyr Ile Ser Glu Cys Ser  
 260 265